MUMBAI

American Center Bulletin

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SPACE RESEARCH

BY CHRISTOPHER MCCABE

Do you feel like an astronaut when you go to the grocery store? How about when you set your watch?

The next time you reset the smoke detector in your home, take a minute to imagine it as part of your own spacecraft's caution and warning system. Because, before they saved lives on Earth, that's where smoke detectors were found on spacecraft designed and built by NASA.

Although NASA's most visible achievements have taken place in space, the technologies that put men on the moon, launched space shuttles, and that will build a space station, have found their way into everyday life on Earth.

These common secondary uses, called space spin-offs, have continuously enhanced the lifestyles of Americans, and strengthened the U.S. economy since the 1950s.

The technologies that led to the computer bar codes in retail stores, quartz timing crystals and household smoke detectors were originally developed for NASA.

NASA technology has provided many benefits to the medical field. The pacemakers used to treat cardiac patients as well as the remote monitoring devices for intensive care patients were derived from the telemetry systems that first monitored astronauts and spacecraft. Much of the portable medical equipment carried aboard ambulances has its roots in NASA's needs for such portable equipment in space.

These are but a few of the more than 30,000 secondary applications of space technology, providing daily benefits in hospitals, offices and homes.

In the past, such spin-offs often happened by chance or coincidence when practical uses of new technologies were found.

NASA is now seeking to make the spin-off a part of the product itself.

Working jointly with private industry to develop technologies that have a use in space and on Earth lessens the cost of development for NASA, and, ultimately, the taxpayer.

Below is a small sampling of the many other ways that space technology has improved our lives and benefited mankind.

Computer Technology – NASA Spin-offs

Ground Processing Scheduling System: The computer-based scheduling system that uses artificial intelligence to manage thousands of overlapping activities involved in launch preparations of NASA's space shuttles. The NASA technology was licensed to a new company which developed commercial applications that provide real-time planning and optimization of manufacturing operations, integrated supply chains, and customer orders.

Semiconductor Cubing: A NASA initiative led to the Memory Short Stack, a three-dimensional semiconductor package in which dozens of integrated circuits are stacked one atop another to form a cube, offering faster computer processing speeds, higher levels of integration, lower power requirements than conventional chip sets, and dramatic reduction in the size and weight of memory-intensive systems, such as medical imaging devices.

Structural Analysis: This NASA program, originally created for spacecraft design, has been employed in a broad array of non-aerospace applications, such as the automobile industry, manufacture of machine tools, and hardware designs.

Windows Visual Newsreader (WinVn): A software program developed to support payload technical documentation at Kennedy Space Center, allowing the exchange of technical information among a large group of users. WinVn provides countless people with Internet access otherwise beyond their grasp, and it was optimized for organizations that have direct Internet access.

Air Quality Monitor: Utilizing a NASA-developed, advanced analytical technique software package, an air quality monitor system was created, capable of separating the various gases in bulk smokestack exhaust streams and determining the amount of individual gases present within the stream for compliance with smokestack emission standards.

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HOLIDAYS

January 1: New Year's Day
January 19: Martin Luther King, Jr.'s Birthday
January 26: Republic Day

A WORD FROM THE CENTER

Dear Friends,

The holiday season is almost over, and as our planet embarks on its next revolution around the sun, we look to outer space for this month's bulletin, which focuses on space research. Many of us may think of space research as a topic reserved for scientists and engineers, but in fact, it impacts our daily lives through many of the products we use routinely.

As a child and young adult, I was active in sports, as many American and Indian youth are. I was surprised to learn that shock-absorbing athletic shoes and radiation-blocking sunglasses were developed for NASA astronauts. Fans of virtual reality gaming will appreciate that some joysticks are based on NASA motors and microprocessors, and some guitars and speaker systems were designed with NASA software.

In 2008, Americans celebrated 50 years of exploring the solar system and expanding human knowledge of the universe. We look forward to the next 50 years, working with our international partners on new advances in healthcare, transportation, public safety, consumer goods, environmental resources, and information technology.

Robyn Remeika
Assistant Cultural Affairs Officer

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Virtual Reality: NASA-developed research allows a user, with assistance from advanced technology devices, to figuratively project oneself into a computer-generated environment, matching the user's head motion, and, when coupled with a stereo viewing device and appropriate software, creates a telepresence experience.

Other spin-offs in this area include: advanced keyboards, customer service software, database management system, laser surveying, aircraft controls, lightweight compact discs, expert system software, microcomputers, and design graphics.

Environmental and Resource Management – NASA Spin-offs

Microspheres: The first commercial products manufactured in orbit are tiny microspheres whose precise dimensions permit their use as reference standards for extremely accurate calibration of instruments in research and industrial laboratories. They are sold for applications in environmental control, medical research, and manufacturing.

Solar Energy: NASA-pioneered photovoltaic power system for spacecraft applications was applied to programs to expand terrestrial applications as a viable alternative energy source in areas where no conventional power source exists.

Weather Forecasting Aid: Space shuttle environmental control technology led to the development of the Barorator which continuously measures the atmospheric pressure and calculates the instantaneous rate of change.

Forest Management: A NASA-initiated satellite scanning system monitors and maps forestation by detecting radiation reflected and emitted from trees.

Sensors For Environmental Control: NASA development of an instrument for use in space life support research led to commercial development of a system to monitor an industrial process stream to assure that the effluent water's pH level is in compliance with environmental regulations.

Wind Monitor: Development of Jimsphere wind measurement balloon for space launches allows for making high resolution measurements of the wind profile for meteorological studies and predictions.

Telemetry Systems: A spin-off company formed to commercialize NASA high-data-rate telemetry technology, manufactures a high-speed processing system for commercial communication applications.

Plant Research: NASA research on future moon and Mars bases is investigating using plants for food, oxygen, and water to reduce the need for outside supplies. This research utilizes hydroponics (liquid nutrient solutions) instead of soil to support plant growth and finds applications for vegetable production on Earth.

Fire Resistant Material: Materials include chemically-treated fabric for sheets, uniforms for hazardous material handlers, crew's clothing, furniture, interior walls of submersibles, and auto-racer and refueler suits.

Radiation Insulation: Aluminized polymer film is a highly effective radiation barrier for both manned and unmanned spacecraft. Variations of this space-devised material are also used as an energy conservation technique for homes and offices. The materials are placed between wall studs and exterior facing before siding or between roof support and roof sheathing. The radiant barrier blocks 95 percent of radiant energy. Successful retrofit installations include schools and shrink-wrap ovens.

Other spin-offs in this area include: whale identification method, environmental analysis, noise abatement, pollution measuring devices, pollution control devices, smokestack monitor, radioactive leak detector, earthquake prediction system, sewage treatment, energy saving air conditioning, and air purification.

Health and Medicine – NASA Spin-offs

Breast Cancer Detection: A solar cell sensor is positioned directly beneath x-ray film, and determines exactly when film has received sufficient radiation and has been exposed to optimum density. Associated electronic equipment then sends a signal to cut off the x-ray source. Reduction of mammography x-ray exposure reduces radiation hazard and doubles the number of patient exams per machine.

Laser Angioplasty: Laser angioplasty with a "cool" type of laser, called an excimer laser, does not damage blood vessel walls and offers precise nonsurgical cleanings of clogged arteries with extraordinary precision and fewer complications than in balloon angioplasty.

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Ultrasound Skin Damage Assessment: Advanced instrument using NASA ultrasound technology enables immediate assessment of burn damage depth, improving patient treatment, and may save lives in serious burn cases.

Human Tissue Stimulator: Employing NASA satellite technology, the device is implanted in the body to help patient control chronic pain and involuntary motion disorders through electrical stimulation of targeted nerve centers or particular areas of the brain.

Cool Suit: Custom-made suit derived from space suits circulates coolant through tubes to lower patient's body temperature, producing dramatic improvement of symptoms of multiple sclerosis, cerebral palsy, spina bifida and other conditions.

Programmable Pacemaker: Incorporating multiple NASA technologies, the system consists of the implant and a physician's computer console containing the program and a data printer. Communicates through wireless telemetry signals.

Ocular Screening: NASA image processing techniques are used to detect eye problems in very young children. An electronic flash from a 35-millimeter camera sends light into the child's eyes, and a photo refractor analyzes the retinal reflexes, producing an image of each eye.

Automated Urinalysis: NASA fluid dynamics studies helped development of system that automatically extracts and transfers sediment from urine sample to an analyzer microscope, replacing the manual centrifuge method.

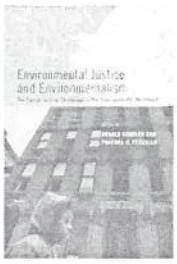
Medical Gas Analyzer: Astronaut-monitoring technology used to develop system to monitor operating rooms for analysis of anesthetic gases and measurement of oxygen, carbon dioxide, and nitrogen concentrations to assure proper breathing environment for surgery patients.

Voice-Controlled Wheelchair: NASA tele-operator and robot technology used to develop chair and manipulator that respond to 35 one-word voice commands utilizing a minicomputer to help patients perform daily tasks, like picking up packages, opening doors, and turning on appliances.

Other spin-offs in this area include: arteriosclerosis detection, ultrasound scanners, automatic insulin pump, portable x-ray device, invisible braces, dental arch wire, palate surgery technology, clean room apparel, implantable heart aid, MRI, bone analyzer, and cataract surgery tools.

Christopher McCabe works at the U.S. Consulate General, Mumbai

A Select List of Books on Space Research

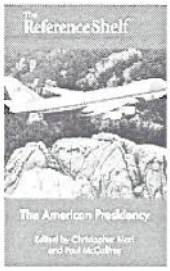


Environmental Justice and Environmentalism: The Social Justice Challenge to the Environmental Movement
by **Ronald Sandler** and **Phaedra C. Pezzullo**
The MIT Press, 2007 (363.7 ENV)

Although the environmental movement and the environmental justice movement would seem to be natural allies, their relationship over the years has often been characterized by conflict and division. In ten original essays, contributors from a variety of disciplines consider such topics as the relationship between the two movements' ethical commitments and activist goals, instances of successful cooperation in U.S. contexts, and the challenges posed to both movements by globalization and climate change.

The Evolution of American Investigative Journalism
by **James L. Aucoin**
University of Missouri Press, 2005 (070.43 AUC)

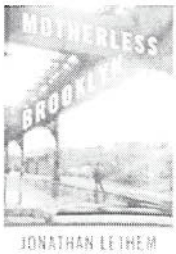
James Aucoin, Associate Professor of Communications at the University of South Alabama, provides a comprehensive history of investigative journalism in the United States, including a thorough account of the founding and achievements of Investigative Reporters and Editors.



The Reference Shelf: The American Presidency
Edited by **Christopher Mari** and **Paul McCaffrey**
The H. W. Wilson Company, 2008 (352.23 AME)

The Reference Shelf contains reprints of articles, excerpts from books, and addresses current issues in the United States and other countries. This issue provides a comprehensive overview of the presidential elections including issues related to the 2008 elections.

Motherless Brooklyn
by **Jonathan Lethem**
Vintage Contemporaries, 1999 (LET)



This book of detective fiction follows the childhood and early adulthood of Lionel Essrog, an orphan with Tourette's syndrome. Together with three veterans from St. Vincent's Home for Boys, he works for small-time mobster Frank Minna's limo service cum detective agency.

MUMBAI MONDAYS

A Discussion on
A History of the Thousand Islands
led by Margaret Ramsay

Monday, January 12
American Center Auditorium **6:00 p.m.**

Margaret "Maggie" Ramsay joined the Foreign Service in March 2008, and is serving her first tour in Mumbai. Prior to joining the Foreign Service, Maggie worked as a research assistant at a social science research group at Royal Holloway, University of London. She also worked as an editorial intern at a local newspaper in upstate New York, which she calls home. Maggie earned a B.A. in Sociology from Boston University in 2005.

The Thousand Islands region and St. Lawrence River seaway in upstate New York is known as a boating and summer recreation hotspot. However, the area also has a fascinating history. This presentation will detail the history of the Thousand Islands, from exploration times to the present, with a discussion of the seaway's antique boats and their history.

Join us at the 2009 Mumbai Festival!

The 2009 Mumbai Festival will take place at venues around the city, from January 15-30, 2009. The U.S. Consulate General is proud to be supporting American cultural performers at the festival, including pianist Richard Bennett; muralist and social activist Judith Baca; New York-based DJ Rekha's fusion of south Asian bhangra with contemporary hip-hop; as well as the Terence Lewis Contemporary Dance Company, performing works celebrating diversity, developed with U.S. Cultural Envoy Marin Leggat.

For more information about the festival, please visit:
http://www.mumbaifestival.in or
http://mumbai.usconsulate.gov.

DEMOCRACY VIDEO CHALLENGE

Create a video of up to three minutes to describe what "Democracy" means to you, and you could win an all-expenses-paid trip to Washington, D.C., New York and Hollywood!

For a complete list of rules, please visit:
http://www.youtube.com/democracychallenge
or http://www.videochallenge.america.gov

All entries must be submitted by January 31, 2009.

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Admission to all American Center programs, restricted to persons over 16, will be on a first-come, first-served basis. The auditorium doors will open 30 minutes before the start of the program.